

Remarks

The Examiner's acknowledgement and entry of the Request for Continued Examination filed February 28, 2005 is noted with appreciation. The Applicants also thank the Examiner for the detailed and thoughtful consideration of the response submitted therewith.

Claims 130, 147 and 148 have been rejected under 35 U.S.C. § 112 ¶ 1 for allegedly failing to comply with the written description requirement. The Applicants respectfully submit that the written description requirement of 35 U.S.C. § 112 ¶ 1 does not require that the language of the claims be literally set forth in the specification. The written description requirement is met when the skilled artisan would appreciate that the claimed subject matter was being performed in the method originally described in the specification. Stated another way, the fundamental inquiry is whether the material added by amendment was inherently contained in the original application. *TurboCare Division of Demag Delaval Turbomachinery Corp. v. General Electric Co.*, 60 USPQ2d 1017, 1022 (Fed Cir 2001). The Examiner's attention is also directed to MPEP § 2163.07(a), which states as follows:

By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter.

(citing *In re Reynolds*, 170 USPQ 94 (CCPA 1971))

Claim 130 has been objected to based on the recitation "drying the phosphor layers with heat". It is respectfully submitted that support for this claim element can be found in the specification, for example, in Example 1 on page 70, lines 11 and 12. The example describes the

coating of phosphor paste in the spaces between the barrier ribs provided on the substrate. The example also describes drying the coated paste at 80 degrees C for 15 minutes. This step inherently involves drying the phosphor layers with heat.

Claim 147 has been objected to based on the recitation of a “detector for detecting the bottom surface of the flat plate”. It is respectfully submitted that support for this claim element can be found in the specification, for example, on page 12, lines 8, 9, 13 and 14, and in original Claim 51. The passages on page 12 describe detecting means for detecting the position of the outlet holes and detecting means for detecting the position of the tips of the outlet holes. As described elsewhere in the specification and shown in Fig. 5, the outlet holes are in the flat plate, and the tips of the outlet holes are at the bottom surface of the flat plate. In addition, a detailed description of sensors and their use is provided on pages 49-54.

Claim 148 has been objected to based on the recitation “an adjuster to adjust an inclination degree of the bottom surface of the flat plate”. It is respectfully submitted that support for this claim element can be found in the specification, for example, on page 12, lines 19-21, and in original Claim 52. The passage on page 12 describes an adjusting means for adjusting the inclination degree of the paste applicator to the top ends of the barrier ribs of the substrate. As described elsewhere in the specification and shown in Fig. 5, the flat plate is part of the paste applicator. Thus, adjustment of the inclination degree of the applicator inherently adjusts the inclination degree of the flat plate as well.

Because the elements of Claims 130, 147 and 148 are all fully supported by adequate written description in the specification in such a way that one skilled in the art would understand that the Applicants had possession of the claimed invention at the time the application was filed, it is respectfully requested that the rejections under 35 U.S.C. § 112 ¶ 1 be reconsidered and

withdrawn.

Claim 139 has been rejected under 35 U.S.C. § 112 ¶ 2 for allegedly lacking antecedent basis for the term “the adjacent two”. Claim 139 has been amended to recite that the shortest distance between any two of the first, second and third straight lines is 600 µm or more.

Claims 141-153 have been rejected under 35 U.S.C. § 112 ¶ 2 as allegedly being indefinite for reciting the base substrate, which is an article on which the apparatus is intended to operate. Previously, Claim 141, from which Claims 142-151 depend, and Claims 152 and 153 recited that the substrate is mounted on the upper surface of the table. Claims 141, 152 and 153 have been amended to recite that the base substrate can be mounted on the upper surface of the table. Thus, it is now more clear that the upper surface of the table is adapted to receive the base substrate, and that the actual presence of the base substrate is not a requirement for infringement of the claim. The Applicants thank the Examiner for this helpful suggestion. In light of the amendments, it is respectfully requested that the rejections under 35 U.S.C. § 112 ¶ 2 be reconsidered and withdrawn.

Claims 121-153 have been rejected under 35 U.S.C. § 103 as allegedly obvious over Nanto, either alone or in combination with Ravi-Chandar, Mettenbrink, Osaka, Koike, Silverbrook ‘281, Kohli and/or Silverbrook ‘241. The Applicants thank the Examiner for the helpful comments with respect to the relevant portions of these references.

Each of the independent claims in the application recite a paste applicator having a flat plate provided with 150 to 2000 outlet holes. With respect to this element, the Official Action indicates, on page 4, lines 12-14 of the second paragraph, that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an applicator with up to 1920 holes in order to have coated the substrate in a single pass. The Official Action further

asserts that the motivation for doing so would be to decrease processing time.

It is believed that the Official Action may have inadvertently relied on impermissible hindsight to piece together the elements of the invention using the Applicant's own disclosure as a roadmap. The use of hindsight is tempting because, in light of the Applicant's disclosure, it may seem at first that incorporation of 150 to 2000 outlet holes would represent a simple modification to the paste applicator of Nanto. However, a proper obviousness analysis requires the difficult but critical step of casting the mind back to the time the invention was made. It is this requirement that guards against entry into the "tempting but forbidden zone of hindsight". *In re Dembiczak*, 50 USPQ2d 1614, 1616-17 (Fed Cir 1999).

In *Dembiczak*, the Examiner rejected claims directed to orange garbage bags that were printed with facial indicia to make them look like decorative pumpkins as obvious over references that individually showed (1) conventional garbage bags and (2) paper bags decorated to resemble pumpkins. Noting that there was no evidence of a suggestion or motivation to combine the references, the Court of Appeals for the Federal Circuit reversed the rejection. In doing so, the Court noted that the step of casting the mind back to the time of the invention and using only the prior art and the then-accepted wisdom in the field is "especially important in the case of less technologically complex inventions, where the very ease with which an invention can be understood may prompt one 'to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.'" 50 USPQ2d at 1617.

Casting the mind back to the time the invention was made, one of ordinary skill in the art had no appreciation for the advantages of a paste applicator having 150 or more holes to eject a phosphor paste. Evidence for this lack of appreciation can be found in the technical explanations and descriptions of the paste applicator in Nanto itself. Nanto discloses a substrate having 1920

grooves to be coated with three kinds of fluorescent pastes. The Fluorescent pastes R, G, and B are each applied into 640 (1920/3) grooves, respectively. (Col. 8, lines 9-12.) Nanto also discloses a dispenser (a paste applicator) in which 5 to 30 nozzles are arranged with a predetermined coating pitch along the direction perpendicular to the ribs. (Col. 4, lines 33-36.) Figs. 15 and 16 of Nanto show a multi-nozzle dispenser having six needle-type nozzles 56a, which are linearly arranged with a pitch that is six times longer than the rib pitch P on the substrate. (Col. 11, lines 45 – 47.) However, Nanto does not describe a dispenser having enough nozzles to coat all of the spaces between the ribs across the entire substrate. The lack of any such description in Nanto, together with the coating methods described therein, is indicative of the then accepted wisdom in the art, namely that a multi-pass coating process was the best method to form a plasma display panel.

Nanto discloses two such multi-pass coating methods for forming a plasma display panel using a dispenser. The first is denoted [A] and explained at Col. 11, line 60 to Col. 12, line 14. The second is denoted [B] and explained at Col. 12, lines 15-29.

According to the method [A], a fluorescent paste is applied while the dispenser is being moved in forward and backward directions. The method [A] comprises a set of steps consisting of (1) moving the dispenser in the X direction, (2) moving the dispenser in the Y direction, (3) moving the dispenser in the X' direction, and (4) moving the dispenser in the Y direction. These steps are repeated until all of the grooves between the ribs, for example 640 grooves, are coated with the three kinds of fluorescent pastes.

According to the method [B], a fluorescent paste is applied while the dispenser is being moved in only one direction. The method [B] comprises a set of steps consisting of (1) moving the dispenser in the X or the X' direction, (2) moving the dispenser in the X' or the X direction,

and (3) moving the dispenser in the Y direction. These steps are repeated until all of the grooves are coated with the three kinds of fluorescent pastes.

Based on a fair reading of Nanto, one of ordinary skill in the art would understand that Nanto teaches only the use of a dispenser in repeated movements consisting of both X or X' and Y directions for coating the fluorescent paste into all of the grooves, that is, the use of multiple consecutive passes to coat all 640 grooves provided on the substrate.

Regarding the multi-nozzle dispenser, Nanto notes that when the coating operation is carried out simultaneously with a plurality of nozzles 56a, it is difficult to apply the fluorescent paste uniformly and accurately into the grooves corresponding to each nozzle if the end surface of the tip of the nozzle is perpendicular to the axis of the nozzle, even though the pitch of the nozzle is set to coincide with the rib pitch with high precision. This is because the fluorescent paste cannot be easily ejected immediately under the tip of the nozzle due to the viscosity and the surface tension of the fluorescent paste. (Col. 12, lines 30 – 39.) Further, Nanto proposes that, when a plurality of nozzles are to be used, it is preferable that each of the nozzles has an end surface formed at an acute angle of θ relative to the axis of the nozzle as shown in Fig. 19. Nanto indicates that it is preferable that the nozzle is held at an acute angle of θ relative to the substrate 50 in the direction of applying the fluorescent paste so that the opening of the tip of the nozzle is oriented in a direction opposite to the direction of applying the fluorescent paste. (Col. 12, lines 40 – 47.)

Following the description of the nozzle-type dispenser, Nanto proposes that it is possible to conduct fluorescent paste application in a way similar to that used for the above-described multi-nozzle dispenser by using a head 63 shown in Fig. 20. (Col. 12, lines 62 – 65.) The head 63 has a multi-nozzle configuration having a plurality of gaps (channels) 56b for ejecting the

fluorescent paste. The gaps 56b correspond to the needle-type nozzles 56a in Fig. 16 (Col. 13, lines 3 – 7). Given the description of Nanto, one skilled in the art would understand that the head 63 is to be used in the same way as the nozzle-type dispenser of Figs. 15 and 16.

Nanto provides no suggestion that the use of the head 63 with its gaps 56b could overcome the difficulty of uniformly and accurately coating fluorescent paste previously described in connection with the needle-type nozzles 56a. Thus, based on a reading of Nanto, one of ordinary skill in the art would understand that the nozzles 56a and the gaps 56b share the same function, and that there is no difference in how they work when coating fluorescent paste into a plurality of grooves provided on a substrate.

In contrast to the teachings of Nanto, the Applicants have surprisingly found that there is a dramatic difference between a dispenser having needle-type nozzles, similar to nozzles 56a of Nanto, and a dispenser having outlet holes provided in a flat plate. A copy of the Declaration of Mr. Yuichiro Iguchi is submitted herewith as objective evidence of the Applicants' findings.

Specifically, the Applicants found that, when the number of the needle-type nozzles contained in a dispenser exceeded 30, irregularities occurred in the coatings between the barrier ribs. (Iguchi Decl., ¶ 3.) In addition, coatings of phosphor paste were sometimes found on the top surfaces of the barrier ribs. *Id.* Thus, producing a substrate for a plasma display having precise coatings between the barrier ribs using a dispenser with more than 30 needle-type nozzles was found to be very difficult. Based on the teachings of Nanto and the then accepted wisdom in the art, one of skill in the art would have thought that a dispenser having many outlet hole-type nozzles would share the same problem as the dispenser having many needle-type nozzles.

However, undaunted by the wisdom of the day and after much experimentation, the Applicants replaced the dispenser having the needle-type nozzles with a dispenser having outlet

hole-type nozzles provided in a flat plate. (Iguchi Decl., ¶ 3.) To their great surprise, the Applicants found that the results obtained with a dispenser having outlet hole-type nozzles in a flat plate had very different results than the dispenser with more than 30 of the needle-type nozzles. In fact, when the number of outlet holes in the flat plate was from 150 to 2000, it was easy to produce a substrate for a plasma display having precise coatings between the barrier ribs. *Id.* This discovery flew in the face of the accepted wisdom in the art at the time, including the teachings of Nantro, and paved the way for the advancement in the field that this invention represents.

Mr. Iguchi has recently performed further experiments to demonstrate the differences between a substrate coated with a dispenser having more than 30 needle-type nozzles and a dispenser having more than 30 outlet hole-type nozzles. (Iguchi Decl., ¶¶ 7-13.) As shown in the Experimental Results and Conclusions section of Mr. Iguchi's Declaration, the substrate coated with the dispenser having needle-type nozzles was markedly different than the substrate coated with a dispenser having outlet hole-type nozzles. (Iguchi Decl., ¶¶ 16-18.) Thus, the evidence provided by Mr. Iguchi proves that the previously accepted wisdom in the art, including those of Nanto (*i.e.*, that a dispenser having multiple outlet hole-type nozzles would function in the same way as a dispenser having multiple needle-type nozzles, and thus, would share the same problems) was not correct. For this reason, Nanto and other systems of its time would not have appreciated that a dispenser having many outlet hole-type nozzles could potentially solve a problem involving a dispenser having many needle-type nozzles.

In addition, Nanto fails to even recognize the problem faced by the Applicants in that when the number of needle-type nozzles provided in a dispenser exceeds 30, it becomes difficult to produce a substrate for a plasma display having precise coatings between barrier ribs.

However, as clearly demonstrated by the results of the Applicants' experiments, there is a large difference between a substrate coated with a dispenser having more than 30 needle-type nozzles and a substrate coated with a dispenser having more than 30 outlet hole-type nozzles. Therefore, Nanto had no appreciation for the problem faced by the Applicants, let alone how that problem could be solved. It has already been explained above that there is no teaching or suggestion in Nanto that a problem associated with the needle-type nozzle could be solved by using a dispenser having many outlet holes provided in a flat plate.

In addition, Mr. Iguchi has performed experiments to demonstrate the differences between a substrate coated in 10 consecutive coating passes using a paste applicator with 64 outlet holes and a substrate coated in a single coating pass using a paste applicator with 640 outlet holes. (Iguchi Decl., ¶¶ 14-15.) The substrate produced using the single pass method had a uniform appearance suitable for use in a plasma display to be marketed commercially, while the multi-pass process produced a substrate having non-uniform appearance that is not suitable for use in a commercial plasma display. (Iguchi Decl., ¶¶ 19-21.)

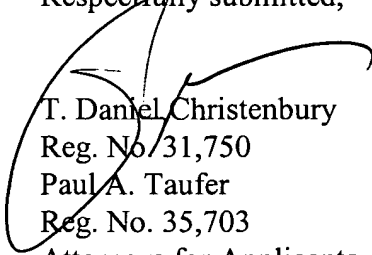
Based on these results, it is apparent that a dispenser having enough outlet hole-type nozzles to coat a substrate in a single pass can produce a substrate that can be marketed commercially. A dispenser that requires multiple passes to coat a substrate, on the other hand, does not produce a commercially viable product. Nanto does not recognize that a dispenser having enough outlet hole-type nozzles to coat a substrate in a single pass would produce a product that is superior to one produced by multiple passes. This is because the accepted wisdom in the art at the time the invention was made was that the best way to coat a substrate for a plasma display was by way of multiple passes, just like the coating methods [A] and [B] described by Nanto. However, as the Applicants' experiments have surprisingly shown, the

substrate produced in a single pass coating method is superior to that produced using multiple passes. In sum, there is no suggestion in Nanto, and there was no motivation in the general knowledge of those skilled in the art at the time of this invention, to use a phosphor paste dispenser having enough outlet hole-type nozzles to coat a substrate in a single pass, *i.e.*, a dispenser having between 150 and 2000 hole-type nozzles. The other references of record also fail to describe or suggest this feature. It is only the Applicants' own unexpected findings that provide the motivation for using a dispenser with 150 and 2000 hole-type nozzles.

Because Nanto, Ravi-Chandar, Mettenbrink, Osaka, Koike, Silverbrook '281, Kohli and/or Silverbrook '241 fail to describe or suggest a paste applicator having a flat plate provided with 150 to 2000 outlet holes, each of the claims in the application is patentable over these references.

For the reasons set forth above, it is respectfully requested that all of the rejections and objections set forth in the Office Action be reconsidered and withdrawn. It is respectfully submitted that the application is now in condition for allowance, which action is earnestly solicited. If the Examiner believes that further minor amendments or correction as to matters of form will expedite allowance, the Examiner is invited to telephone the Applicants' undersigned representative.

Respectfully submitted,



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